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Longitudinal Study on Social Networks as a Didactic Method

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Estudio longitudinal sobre redes sociales como método didáctico

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Abstract

This article gathers the perceptions of students on social networks, as a didactic method, with the aim of searching and designing didactic strategies to adapt the contents and methodology to the new technological context. The participants were university students of Early Childhood and Primary Education in 2013-2014 and 2016-2017. A longitudinal study was conducted with a descriptive, non-experimental methodology and the semi-structured questionnaire used was validated through factorial and cluster analyses. The students from both degrees showed a polarization and dispersion of opinions about social networks, which could be related to a more critical attitude toward their advantages and disadvantages.

Keywords

Social media; methodology; early childhood education; primary education

Resumen

Este artículo recoge las percepciones de los estudiantes sobre las redes sociales como método didáctico, con el propósito de investigar y diseñar estrategias didácticas para adaptar los contenidos y la metodología al nuevo contexto tecnológico. Los participantes fueron estudiantes universitarios del programa de Educación primaria y de la temprana infancia de los periodos 2013-2014 y 2016-2017. Se hizo un estudio longitudinal con una metodología no-experimental, descriptiva y se validó un cuestionario semi-estructurado a través de análisis factorial y de grupos. Los estudiantes de ambos periodos mostraron una polarización y dispersión de opiniones sobre las redes sociales, lo que podría estar relacionado con una actitud más crítica con respecto a sus ventajas y desventajas.

Palabras clave

Redes sociales; metodología; educación en la temprana infancia; educación primaria

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Introduction

Theoretical justification

The present article presents a longitudinal study, which was initiated in the academic year 2013-2014 and finished in 2016-2017, with the aim of knowing the perceptions of students of the Faculty of Education Sciences of the University of Seville on the use of social networks as a didactic method.

There is an increasing number of people who defend the educational applications of social networks by stating that they should be incorporated into teaching since they can be a means of learning and stimulating the interest of students on their education. Moreover, universities must accept the challenge of social networks to adapt to current communication. Students have changed radically and they are no longer the people for whom our education system was designed (Prensky, 2001).

Considering the technological skills of these students and their communicative habits, there are many authors who propose the use of web 2.0 and, specifically, social networks, as educational tools that favour the teaching and learning process in the classroom. Web 2.0, and especially social networks, have favoured the creation of virtual learning communities and many peer collaboration networks (Cabero-Almenara & Marín-Díaz, 2014; García-Sans, 2008; Sloep & Berlanga, 2011), which are networks based on the principles of reciprocity and cooperation (Cobo-Romaní & Pardo-Kuklinski, 2007) that use Facebook, Twitter and other similar services.

Therefore, due to their repercussion, it would be appropriate to consider them as feasible spaces to bring educational information to students who, once connected, can make good use of their time to consult educational contents and interact with their teachers and classmates (Carvalho-Beluce & De Oliveira, 2016; Valenzuela-Argüelles, 2013).

Among the educational applications of social networks, there is a more satisfying learning for students that increases their motivation as they have the possibility to interact with other students as either instructors or listeners. Furthermore, social networks adapt easily to any subject or course, and they can be used at the same time by several connected users, which allows a high level of interactivity, a simultaneous feedback or exchange of data, time saving and easy access (Gunawardena, Hermans, Sánchez, Richmond, Bohley & Tuttle, 2009; De Haro Ollé, 2010; Huijser, 2008; Maloney, 2007; Teo, 2014).

There are studies and experiments that indicate the convenience of incorporating social networks into university teaching, supporting face-to-face lecture (Castañeda-Quintero, 2010; Donlan, 2014; Gértrudix, 2009; Gewerc-Barujel, Montero-Mesa & Lama-Penín, 2014; Helvie-Mason & Edwards, 2010; Hoyer, Thompson, LeBleu & Collard, 2010; Piscitelli, Adaime & Binder, 2010; Raacke & Bonds-Raacke, 2013; Toro-Araneda, 2010, Túñez-López & Sixto-García, 2012), through discussions, knowledge transfer (Álvarez & López, 2013), evaluation (García-Suárez, Trigueros-Cervantes & Rivera-García, 2015) or the announcement of topics or ideas (Gallardo-Echenique, Marqués-Molías & Bullen, 2015; Peixoto, 2015).

There is a large number of studies on different social networks. For instance, some authors have focused on determining the perception of young university students on the use of the social network Twitter in the teaching and learning process (Junco, Heiberger & Loken, 2011; Larequi, 2015; Ortega-Barba & Banderas-Campero, 2012). The conclusions drawn from these studies allow to assert that university students are interested

Article description | Descripción del artículo
In this scientific research article, derived from the project *Diagnosis and training of teachers for the incorporation of ICT in classes with functional diversity*, the authors carried out a longitudinal study about the perceptions of student teachers on social networks as a didactic method, with the aim of searching and designing didactic strategies in the classroom and adapting the contents and the methodology to new technological means, structures and applications.

on working with strategies that involve the use of technology because these provide them with a better horizontal communication with the teacher. Another element that students appreciate is the teacher's follow-up, since the system allows to verify the answers given. On this social network, other studies have revealed great participation from the students; this is in contrast with the poor involvement in other alternatives, such as virtual institutional platforms (Cosgrave, Rísquez, Logan-Phelan, Farrelly, Costello, Palmer, McAvinia, Harding & Vaughan, 2011; Goodyear, Casey & Kirk, 2014; Salavuo, 2008), which are normally used as repositories to store the subject material of the modules.

On the other hand, Bahar Baran (2010), Cinta Espuny-Vidal, Juan González-Martínez, Mar Lleixà-Fortuño and Mercè Gisbert-Cervera (2011), Koldobika Meso-Ayerdi, Jesús Ángel Pérez-Dasilva and Terese Mendiguren-Galdospin (2011) and Timothy Teo (2014) analysed the possibilities that the social network Facebook can offer, as a tool for collaborative learning. The aim is for students to get involved in a constant learning process that fosters collaboration and exchange. In order to achieve this, the authors propose a set of activities, such as messaging through this social network, choosing administrators, uploading pictures and videos to the network, publishing articles with the possibility of writing comments about them, having conversations on Facebook walls, participating in discussion forums, and creating events that allow, for instance, to invite students to a conference, seminar or presentation of books that could be of interest to them. As a consequence, students develop a positive attitude toward the use of Facebook for academic learning.

There are not many studies in which social networks had been used strictly with educational purposes. For Jose Luis Poza-Lujan, Ángeles Calduch-Losa, Ana Albors, Marga Cabrera, Dolores Teruel, Miguel Rebollo and Rebeca Díez-Somavilla (2014), the use of social networks in the teaching-learning process is reserved to some isolated experiences, although they consider that the inclusion of social networks in daily teaching activities is very interesting.

Therefore, the solution is to search for ways to use social networks in the classroom with educational purposes and design strategies that guarantee the success of this initiative. This involves adapting the academic knowledge and didactic methodology to the new technological formats, means and applications, and also to the skills, communication ways and interests of current students. In order to achieve so, it is important to know their perceptions on the use of these means as didactic methods, considering that they will be teachers themselves in the near future.

Methodology

A longitudinal study and a cluster analysis were conducted, using as reference the factors obtained in the exploratory factor analysis. A non-experimental (or *ex post facto*) methodology was employed, which is fundamentally characterised by the fact that it is an empirical search, in which the researcher has no direct control over the independent variables because these are neither modified nor submitted to experimental control (Latorre, Del Rincón & Arnal, 2005).

Objectives

The main objective of the present study was to "determine the perceptions of students of the Faculty of Education Science of the University of Seville about the use of social networks as a didactic method". This objective consisted of the following sub-objectives:

- Analyse the perception of students on the innovative possibilities of social networks from the beginning of the degree to the end of it.
- Analyse the perception of students on the relational possibilities of social networks from the beginning of the degree to the end of it.
- Analyse the perception of students on the educational possibilities of social networks from the beginning of the degree to the end of it.
- Analyse the perception of students on the informative possibilities of social networks from the beginning of the degree to the end of it.
- Compare the evolution, throughout the degree, of the perception on social networks with more educational possibilities.
- Analyse the evolution, from the beginning of the degree to the end of it, of the advantages and drawbacks of social networks in education.

Population and sample

The sample of this study consisted of students of the degrees in Early Childhood Education and Primary Education of the Faculty of Education Sciences at the University of Seville. To locate them, we asked the head of the faculty to provide us with a list of the total number of students in the registry, which were a total of 887 students of both genders in the second year of Early Childhood Education (199 students) and Primary Education (688 students) registered for the academic year 2013-2014. For the sample, in order to obtain a homogenous distribution and high representativeness, 25% of the total were selected, which resulted in a sample size of 50 students from the Degree in

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Early Childhood Education and 172 students from the Degree in Primary Education. It is important to highlight that the female percentage of the population in Early Childhood Education and Primary Education is 98% and 75%, respectively. The sample age ranges from 18 to 25 years. Since it is a longitudinal study, the sample for the academic year 2016-2017 was not smaller for the group of Early Childhood Education, which remained at 50 students. However, 21 students were lost from the group of Primary Education, whose sample size decreased to 151 students. With regard to gender, 79.1% are female.

Experiment design

The present work consists in a descriptive longitudinal study designed to evaluate how students perceive social networks as didactic methods at two different moments of the present time. The longitudinal character is justified by the difference in the results between the second and fourth year of the two degrees. The data were collected at two different time points: in the academic year 2013-14, during October and November, and in the academic year 2016-17, during April and May. This evaluation was always conducted with the same subjects, through time, by which the so-called cohort effect was removed. The main characteristic of this type of study is the observation, in a sequenced manner, of the same dependent variable as a function of time. Thereby, the differences observed in people are less likely to result from cultural differences between generations and more likely to show truly significant quantitative differences (Arnau & Bono, 2008; Singer & Willett, 2003).

Research techniques and instruments

In order to carry out the study, a questionnaire was designed to measure the perceptions of students on the usefulness of social networks as didactic methods, which was one of the most complex tasks performed in the entire process. To devise this questionnaire, the authors did a thorough revision of the studies performed on social networks and a database was created through an initial survey with open questions targeted to the students of Early Childhood Education and Primary Education. Next, the data were distributed into a matrix composed of four categories (relational, innovative, educational and informative), which comprise what we consider to be perceptions on social networks, and then the items that serve as the basis of each category were defined.

The questionnaire created and validated through factor analysis using principal component analysis was named as "questionnaire about the use of social networks in education, QUASNE" (*Cuestionario sobre el uso de las redes sociales en educación, CURESE*) and consists of 30 items distributed as follows:

Ethnographic data: it comprises items 1-6, which correspond to age, gender, degree, course, access to internet at home, and the age at which they used social networks for the first time.

Relational category: it focuses on determining the present relationship of students with social networks (items 7-11), with different response alternatives referred to the interest, frequency and reasons for the use of social networks.

Innovative category: the purpose of this category is to know the usefulness of social networks for students, since in many cases they are not used wisely or regularly. The category is composed of items 12-17 and, except for item 12, which has a simple set of answers (yes/no, do not know/no opinion), in the other items there are different answers referred

to the different educational possibilities of social networks about sharing documents and pictures, fostering communication between teachers and students, sharing knowledge among students, sharing knowledge among users and fostering communication in general.

Educational category: the aim of this category is to determine the appreciation of the educational possibilities of social networks (items 18, 22-27, 30, 33 and 34-36). It is a Likert scale with four response alternatives that range from "Nothing" (1) to "A lot" (4).

Informative category: this category shows the appreciation of students about the informative possibilities of social networks (items 19-21, 28, 29, 31 and 32) and presents four response alternatives that range from "Nothing" (1) to "A lot" (4).

To validate the questionnaire, a factor analysis was conducted using the principal component analysis method, which allows to transform a set of interrelated variables into another set of unrelated variables known as factors. Next, Table 1 shows the total variance explained. Extraction method: main component analysis.

Table 1
Total variance explained. Extraction method: main component analysis

Component	Initial eigenvalues			Extraction sums of squared loadings		
	Total	% of variance	% accumulated	Total	% of variance	% accumulated
1	1.860	46.504	46.504	1.860	46.504	46.504
2	1.163	29.066	75.570	1.163	29.066	75.570
3	.645	16.131	91.701			
4	.332	8.299	100.000			

Source: own formulation

The present analysis summarises the set of variables studied by calculating synthetic indicators for each of the categories; the principal component analysis of the axes was applied to optimise the factor scores in the summarised model in two principal components that were used later on in the cluster analysis. In this model, the results of the analysed data were standardised and normally distributed. After conducting the factor analysis, it was observed that over 75% of the variance was explained, considering a favourable Kaiser-Meyer-Olkin index, KMO index of 0.6, and the Bartlett's sphericity test showed a *p*-value below 0.05. Next, Table 2 shows the principal component analysis:

Table 2
Component score coefficient matrix

Category	Component 1	Component 2
Innovative category	.325	.442
Relational category	.164	.704
Informative category	.455	-.249
Educational category	.455	-.326

Source: own formulation

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In *component 1*, there is predominance of high or positive values of the questions about the informative and innovative categories; *i.e.* the appreciation of students about the informative and innovative possibilities of social networks, as well as higher or more positive values in the questions about the educational category, which is the one that gathers the perception on the educational possibilities of social networks.

On the other hand, in *component 2* there are higher values of the relational category, which determines the relationship of students with social networks; high values mean high frequency of use and interest in this category.

The purpose of this analysis, through principal components, was to verify that the categories that make up the questionnaire used for the collection of data have a high level of reliability.

Statistical techniques for data analysis

Once all the data were obtained, the information gathered and systematically codified was loaded into a data matrix to analyse and read it using the statistical software SPSS10.

The information generated from the data gathered through the semi-structured questionnaire was analysed with the aim of obtaining homogenous groups of student profiles regarding social networks and their evolution of the second and fourth year in Early Childhood Education and Primary Education was studied through the longitudinal analysis.

To achieve this, a descriptive analysis was conducted, in which the dependency between the variables was explained, where the dependent variable of perceptions and attitudes toward social networks as didactic methods can be explained according to different factors, with emphasis on those variables that evolved through time in the groups of Early Childhood Education and Primary Education.

Then, a cluster analysis was conducted, using as reference the factors obtained in the exploratory factor analysis, which are the starting point for such analysis.

Results and discussion

In this section we present the results of the longitudinal study carried out with the students of Early Childhood and Primary Education in two different courses (2nd and 4th year) of the degree. The results are presented and discussed, taking as a reference the demographic variables; then, the descriptive analysis based on each of the categories of the study is shown in Figures 1 to 6. Lastly, through the cluster analysis, the evolution of the perception on social networks along the degree is shown in Figures 7a, 7b and 8a y 8b.

For the demographic variables a frequency distribution of central tendencies was performed and for the rest of the variables, since the sample was distributed in independent groups, a non-parametric analysis technique was used (chi-squared).

Thereby, we formulated the null hypothesis, which states that "there are no significant differences in the longitudinal study between the groups of the second year of Early Childhood Education and Primary Education and the groups of the fourth year of Early Childhood Education and Primary Education for any of the categories analysed", and the alternative hypothesis, which stated that "there are significant differences in the longitudinal study between the groups of the second year of Early Childhood Education and Primary Education and the groups of the fourth

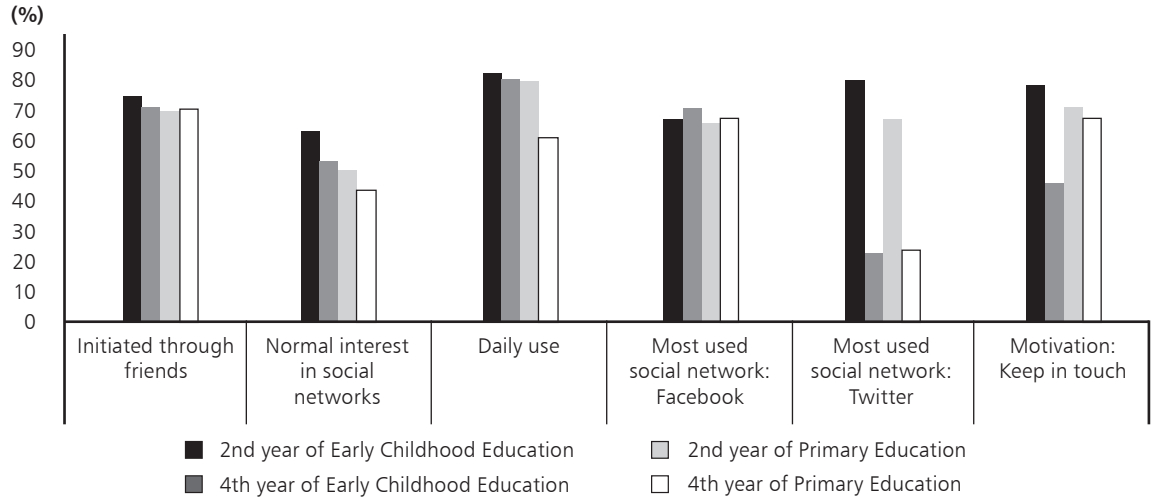
year of Early Childhood Education and Primary Education for each of the categories analysed".

The α confidence level was established at 0.05, in order to demonstrate the statistical decision on these differences in comparison with significance (*p*).

Next, Figure 1, we present the analysis of each category.

Figure 1

Relational category. Factors related to the use of social networks



Source: own formulation

Relational category: this category comprises the factors related to the use of social networks and presents the responses obtained from the students of Early Childhood Education and Primary Education at two different time points; *i.e.* an initial time point when they were studying the second year and a final time point when they were studying the fourth year. The longitudinal analysis was carried out with items 7-11, which correspond to who initiated them, interest level, frequency of usage, most used social network and reasons for using social networks.

In item 7 ("who initiated you in the use of social networks?"), from the responses obtained we can confirm that, as a remarkable finding, in most cases it is friends who introduce users to social networks, with 78% and 73% in the second year of Early Childhood Education and Primary Education, respectively, compared to 74% and 74% in the fourth year of Early Childhood Education and Primary Education, respectively.

In item 8 ("how would you rate your interest in social networks?"), the responses obtained through the scale are mostly positive, with 66% and 53% for "normal" and "a lot", respectively, in the initial time point, and 56% and 46% at the final time point. However, we observed that 12% of the students in Primary Education responded "little" or "nothing".

In item 9 ("how frequently do you use social networks?"), there were three response alternatives: several times a month, several times a week and daily. In view of the results, we can confirm that the use of social networks takes place daily in both groups with 86% and 84% at the initial time point, compared to 84% and 64% at the final time point, which suggests that there are no significant differences in the groups through time.

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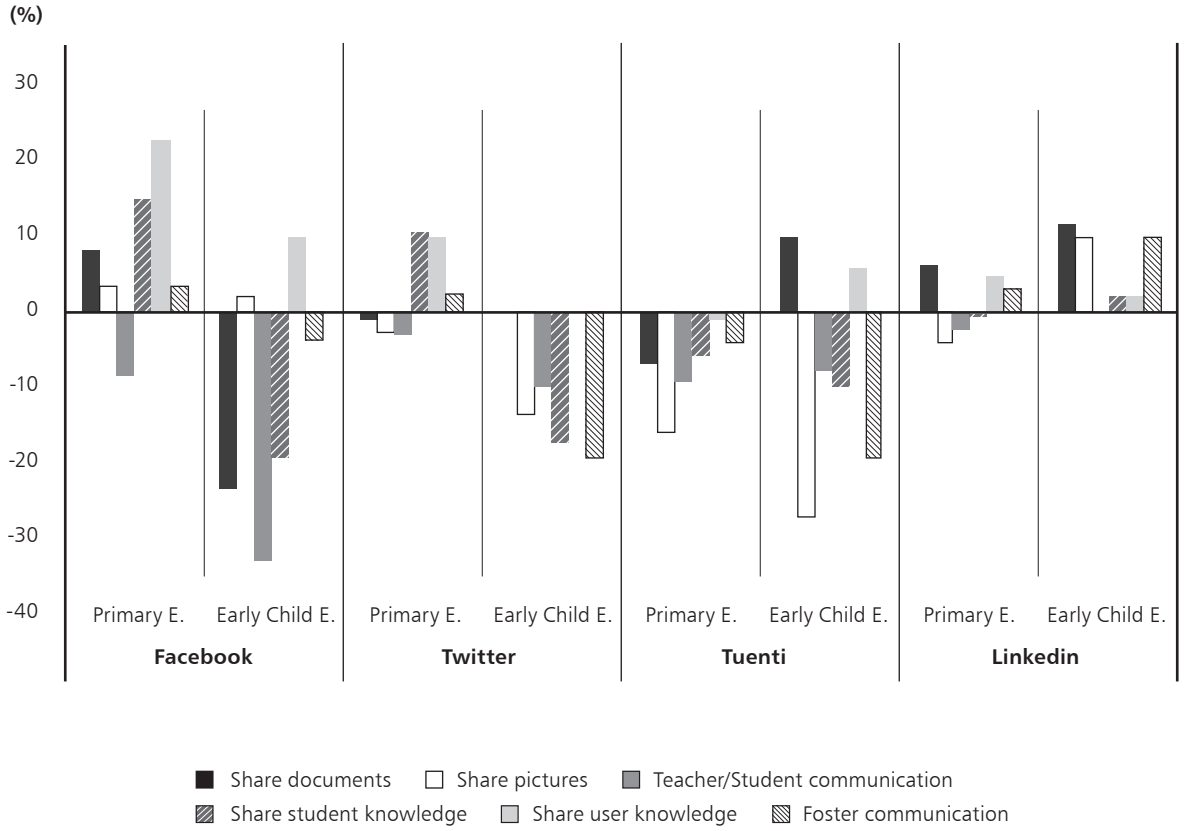
In item 10 ("which social network do you use more frequently?"), most of the responses in both groups, Early Childhood Education and Primary Education, were Facebook and Twitter, respectively. However, we must highlight the differences found in Twitter in the longitudinal analysis between the initial time point, with 84% and 70%, and the final time point, with 24% and 25%, respectively. The chi-squared value ($\chi^2 = 9.874$), and the significance level associated to it (0.001), demonstrate that the imbalance and the variances observed are not due to chance.

Item 11 comprises the questions about the reasons for using social networks. The students of both groups showed clearly that the reasons were "entertainment", with 74% and 70% at the initial time point compared to 68% and 79% at the final time point, and "keeping in touch", with 82% and 74% at the initial time point compared to 48% and 71% at the final time point. The chi-squared value ($\chi^2 = 5.994$), and the significance level associated to it (0.01), demonstrate that the imbalance and the variances observed are not due to chance.

For items 7, 8 and 9, provided that a confidence level (α) below 0.05 was established, it is not possible to demonstrate the differences observed between the variables in time, since the significance level obtained was higher than expected. Next, Figure 2, we present the analysis of Innovative category.

Figure 2
Innovative category. Usefulness of social networks



Source: own formulation

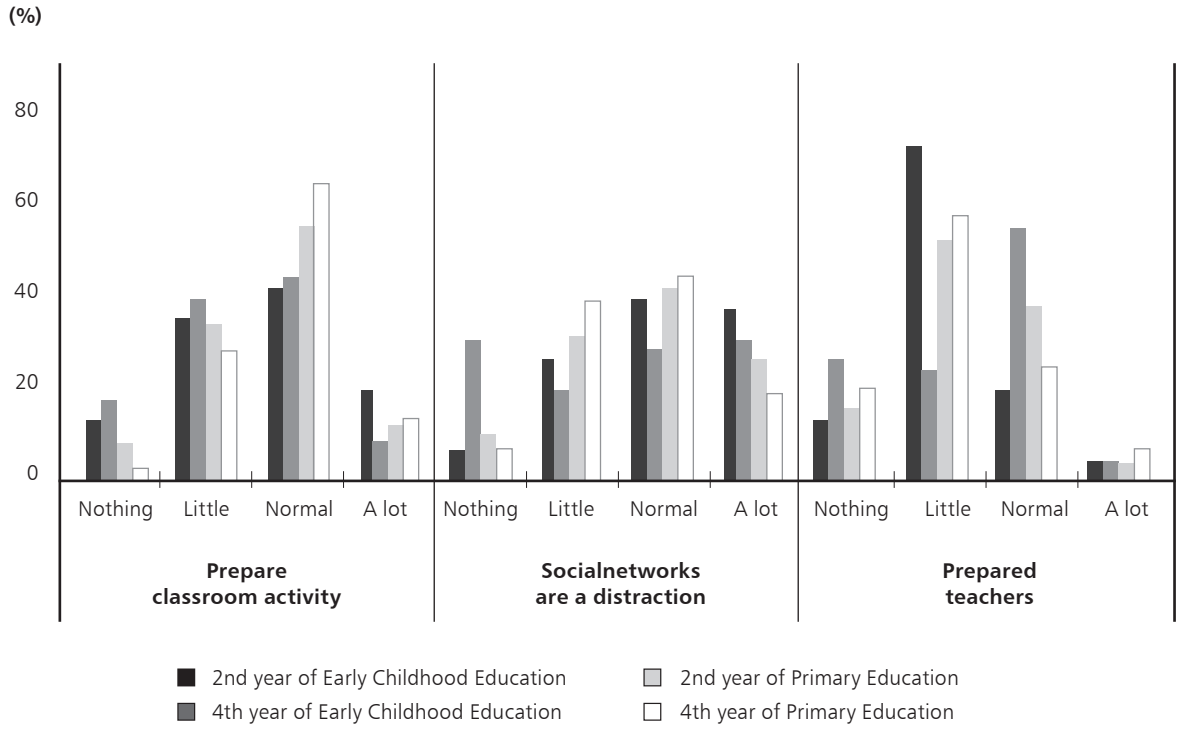
Innovative category: items 12-17, related to the usefulness and relevance of social networks in education.

The responses to the question of item 12 ("do you think that social networks could be useful in education?") were generally and mostly positive in the two groups, both at the initial time point, with 88% and 94%, and at the final time point, with 82% and 94%, in Early Childhood Education and Primary Education, respectively.

In items 13-16, related to the usefulness of social networks such as Facebook, Twitter, Tuenti, Hi5, MySpace and LinkedIn, in sharing documents and pictures, fostering communication between teachers and students, sharing knowledge among students, sharing knowledge among users and fostering communication in general; the responses for "sharing documents", with 70% and 47% initially compared to 46% and 56% at the final time point, and "sharing knowledge among students", with 52% and 45% initially compared to 32% and 60% at the final time point, were the ones selected by most of the participants in Facebook for both groups of Early Childhood Education and Primary Education. The chi-squared value ($\chi^2 = 9.498$), and the significance level associated to it (0.002), demonstrate that the imbalance and the variances observed are not due to chance.

For item 17 ("which social networks do you consider to be relevant as a complement to face-to-face teaching?"), the responses of both groups were mostly for Facebook, with 82% and 67% at the initial time point compared to 72% and 70% at the final time point. Next, Figure 3, we present the analysis of educational category.

Figure 3
Educational category. Social networks improve the teaching-learning process



Source: own formulation

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Educational category: it comprises items 18, 22-27, 30, and 33-36, with the response alternatives "nothing", "little", "normal" and "a lot", which allowed to determine whether social networks improve the teaching-learning process in the classroom. A longitudinal analysis of the responses obtained from the students at two different time points is conducted. Most of the responses were "normal" at the positive part of the table and corresponded to the initial and final time points of both groups, Early Childhood Education and Primary Education, respectively, as follows: social networks improve the learning process in the classroom (36% and 53% compared to 50% and 52%), social networks foster synthesis capacity (58% and 53% compared to 50% and 48%), social networks encourages self-learning in students (36% and 47% compared to 50% and 42%), social networks improve cooperative learning (44% and 39% compared to 40% and 47%), social networks stimulate the interest of students in their own training (42% and 50% compared to 42% and 41%), social networks are essential for quality learning (38% and 45% compared to 38% and 47%).

However, the alternative "a lot" was mostly selected in the item "teachers need training before using social networks in their classroom" (48% and 58% compared to 32% and 68%), and the alternative "nothing" was mostly selected in the item "social networks must be forbidden in the classroom (42% and 56% compared to 68% and 50%). The alternative "normal" was mostly selected in the items "social networks are advisable for preparing classroom activities" (38% and 50% compared to 40% and 59%) and "the use of social networks is discouraged because they distract students from studying" (36% and 38% compared to 26% and 40%), and the alternative "little" was mostly selected in the item "teachers are ready to use social networks in their classroom" (66% and 47% compared to 22% and 52%).

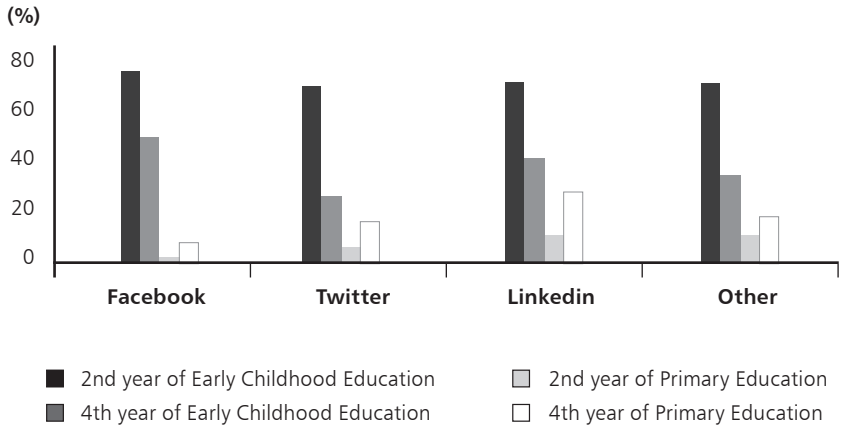
It can be confirmed that there are no correlations between the variables observed and the specialty of the participants. However, it must be highlighted that there is a correlation between the groups analysed with regard to the item "teachers need *a lot* of training before using social networks in their classroom"; the chi-squared value ($\chi^2 = 1.745$), and the significance level associated to it (0.001), demonstrate that the imbalance and the variances observed are not due to chance.

Next, Figure 4, we present the analysis of item 36, which was conducted independently due to its high significance level.

From item 36 ("in your opinion, of all the social networks, which one has the greatest educational potential?"), through the analysis of the results we can confirm that both groups, at both time points, selected mostly Facebook (74% and 70% compared to 68% and 69%) and Twitter (48% and 40% compared to 26% and 34%), leaving the other social networks behind with lower percentages; *e.g.* LinkedIn (8% and 11% compared to 6% and 11%). Figure 5 shows the distribution of the results.

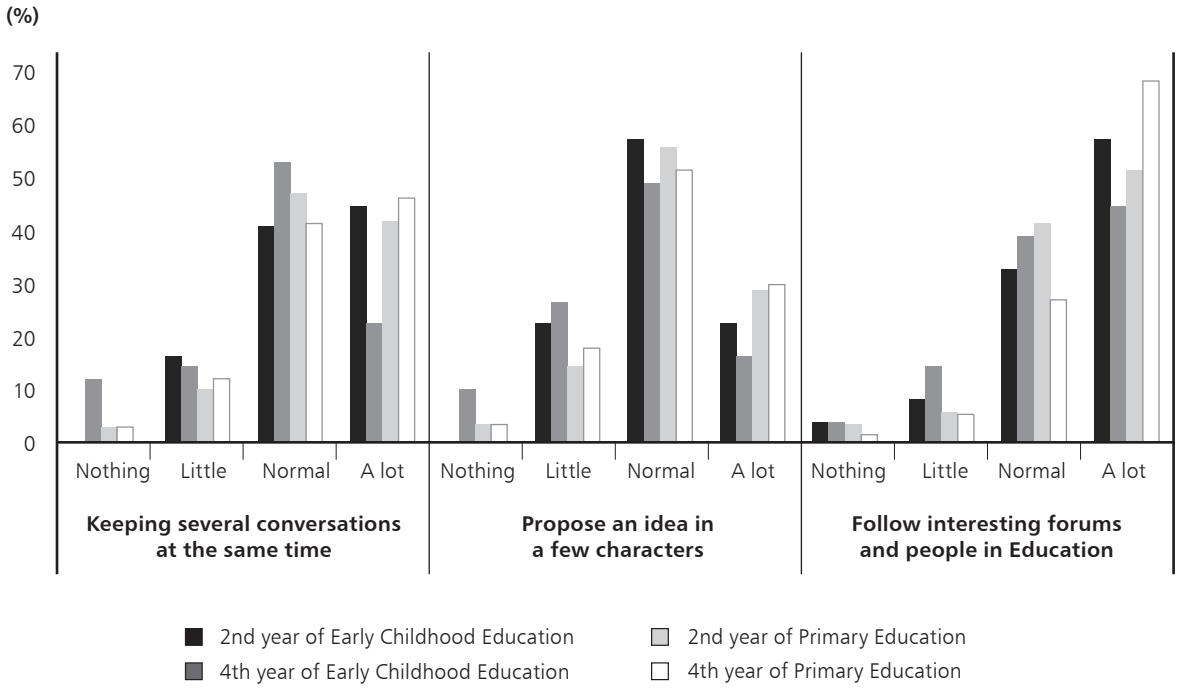
Through the non-parametric contrast analysis, we can confirm that there are no correlations between the relationships observed in time and the degrees of the participant; except for Twitter, for which a chi-squared value of $\chi^2 = 4.725$ and the significance level associated to it (0.03) demonstrate that the imbalance and the variances observed are not due to chance.

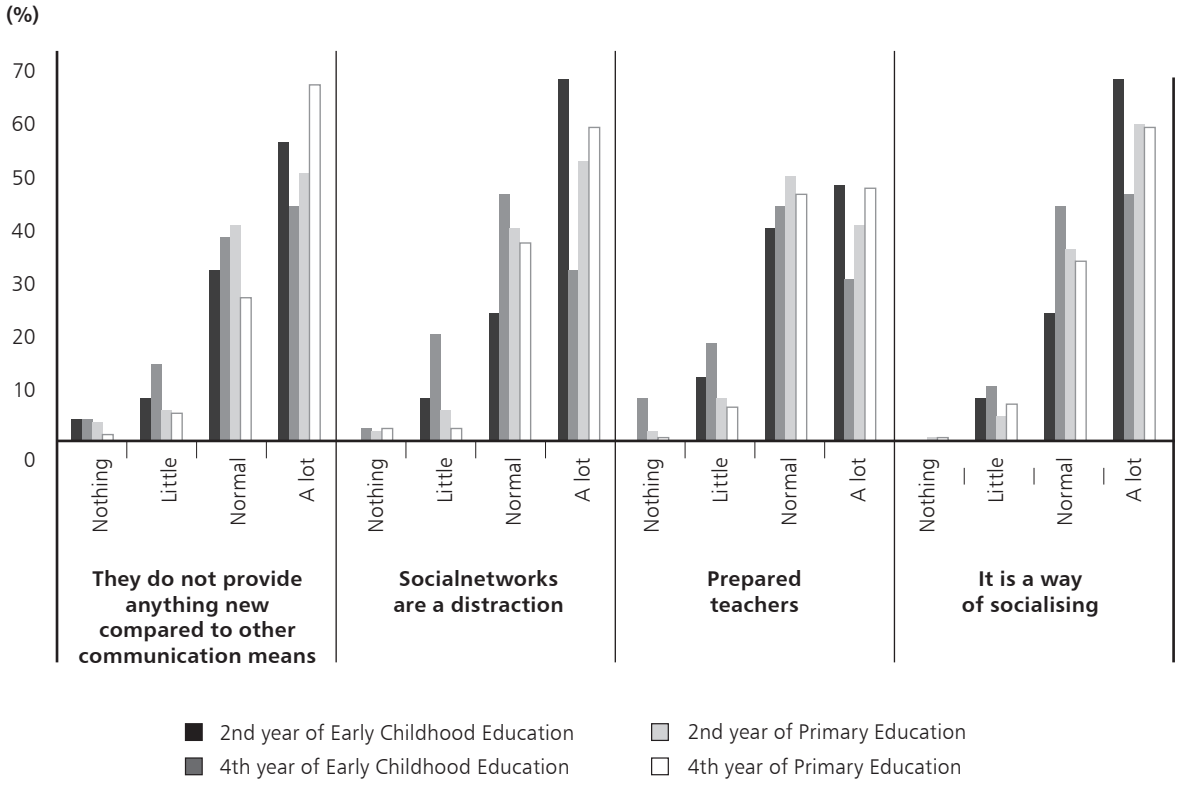
Figure 4
Educational category. Social network with the greatest educational potential



Source: own formulation

Figure 5
Informative category. Level of information provided by social networks





Source: own formulation

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Informative category: it comprises items 19-21, 28, 29, 31 and 32, which are related to the level of information provided by social networks. The responses given by the students corresponded to the alternatives "nothing", "little", "normal" and "a lot". The highest scores were obtained in the response alternatives "normal" and "a lot" at the positive part of the table, and corresponded to the initial and final time points of both groups, Early Childhood Education and Primary Education, respectively, as follows: "social networks in education allow to have several conversations at the same time" (40% and 46% compared to 52% and 40%), "social networks in education allow to propose an idea in a few characters" (56% and 54% compared to 48% and 50%), "social networks allow to follow forums and people who provide interesting information about educational topics" (56% and 50% compared to 44% and 67%), "social networks do not provide anything new compared to other communication means" (56% and 50% compared to 44% and 67%), "social networks are strongly advised for keeping up to date" (68% and 53% compared to 32% and 59%), "social networks are a good way of sharing and creating knowledge" (40% and 50% compared to 44% and 46%), "social networks are a good way of socialising" (68% and 59% compared to 46% and 59%).

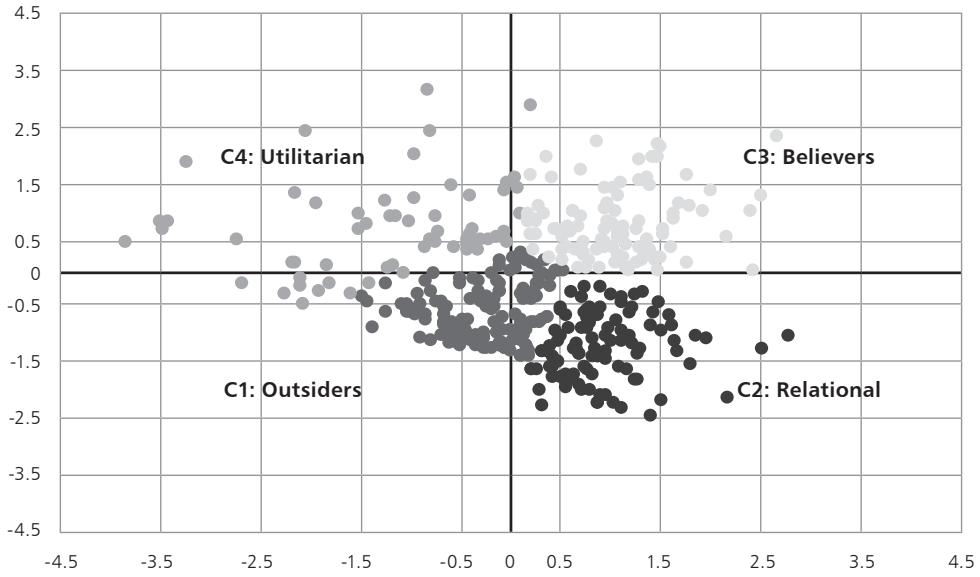
Considering the results obtained, we can confirm that, for both groups, social networks help the flow of information in the field of education.

Figure 5 shows that most of the students preferred the alternatives "normal" and "a lot", and no significant differences were found neither between the two degrees nor between the two time points of the longitudinal study. It can be inferred that the participants responded positively in most the items of the informative category. Provided that a confidence level (α) below 0.05 was established, it is not possible to demonstrate the differences observed between the variables, since the significance level obtained was higher than expected.

With regard to the cluster analysis, the factor scores of the categories are presented in each of the axes. These categories are the starting point of the hierarchical cluster analysis and they allow to analyse the homogenous groups that are generated according to the degree and the year (2^{nd} or 4^{th}), with the aim of determining the influence of the time period lapsed on the perception of the students on social networks as didactic methods.

Next, we present the results of the cluster analysis, where two main groups were formed. For this analysis, the maximum distance for each category represented in each of the axes was adapted to the characteristics of the values of the factor model, as shown in Figure 6.

Figure 6
Cluster analysis



Source: own formulation

Cluster 1 (Outsiders): students with lower scores for the educational potential of social networks in all the categories (innovative, informative, educational and relational).

Cluster 2 (Relational): students with higher scores for the educational potential of social networks in the relational and innovative categories, and lower scores in the other two categories.

Cluster 3 (Believers): students with higher scores for the educational potential of social networks in all the categories (innovative, informative, educational and relational).

Cluster 4 (Utilitarian): students with higher scores for the educational potential of social networks in the educational, informative and innovative categories, and lower scores in the relational category.

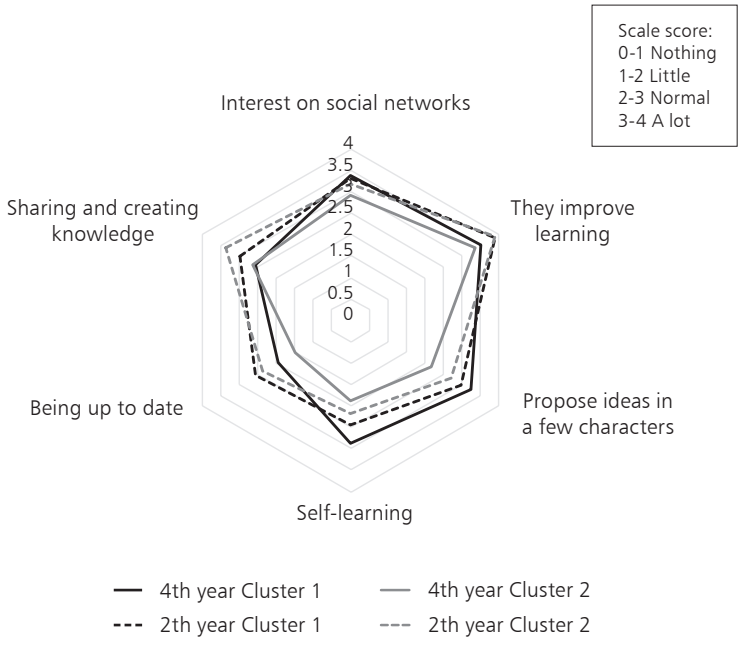
With regard to the cluster analysis, the Ward model was used, and the results show that the "utilitarian" group has a greater proportion of people between 26 and 33 years of age and a later initiation age in the use of social networks; however, these are the ones who show a more positive evolution of their interest in social networks, and they consider them to be more relevant as a teaching complement. The "relational" group showed the sharpest decrease in the frequency of internet usage and the lowest interest in social networks, and they consider them to be less relevant as a teaching complement.

The evolution of "believers" and "outsiders" from the 2nd to the 4th year shows values of evolution and positive interest regarding social networks, with a higher preference for the use of Twitter or LinkedIn over Facebook in the "believers" group, in contrast to the "outsiders" group.

Next, we present Figures 7a, 7b and 8a, 8b, which show the evolution in the degrees of Early Childhood Education and Primary Education from the 2nd to the 4th year, as a function of the variables that show more significant changes of the clusters.

Figure 7a

Evolution in the degree of Early Childhood Education



Source: own formulation

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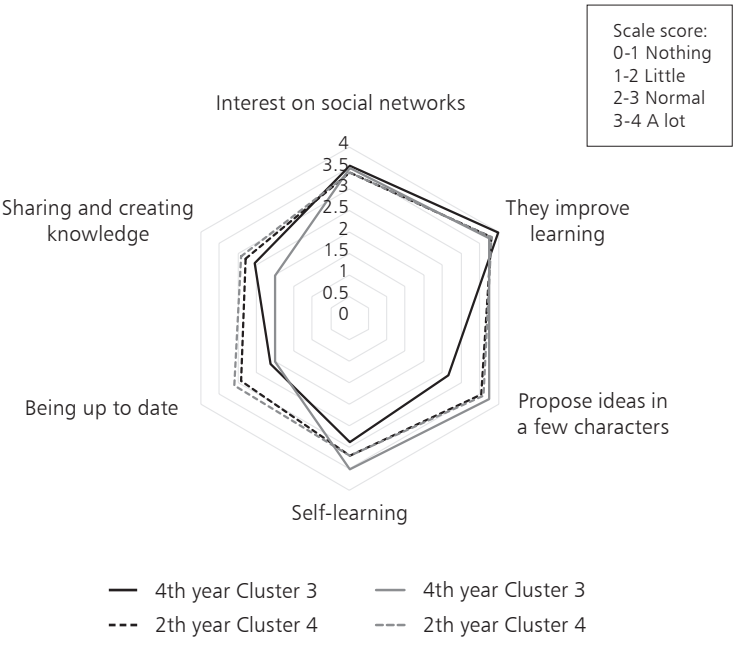
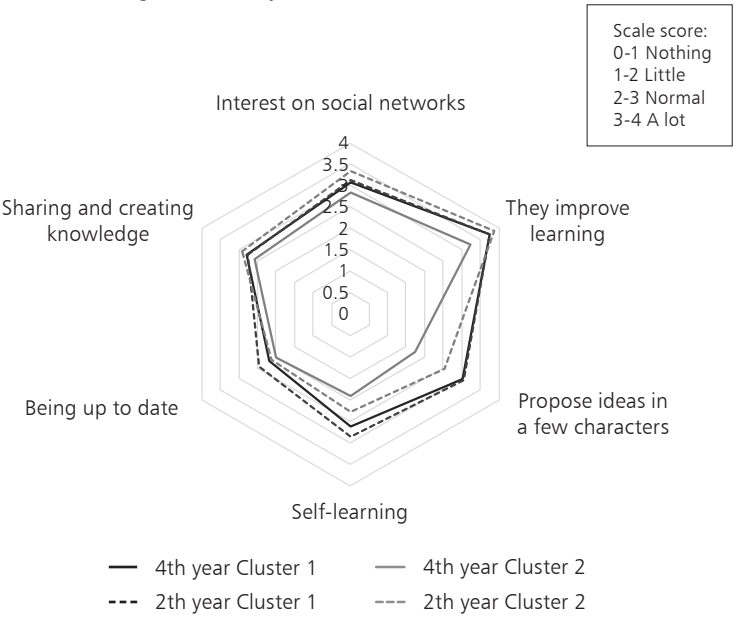
Figure 7b
Evolution in the degree of Early Childhood Education



Source: own formulation

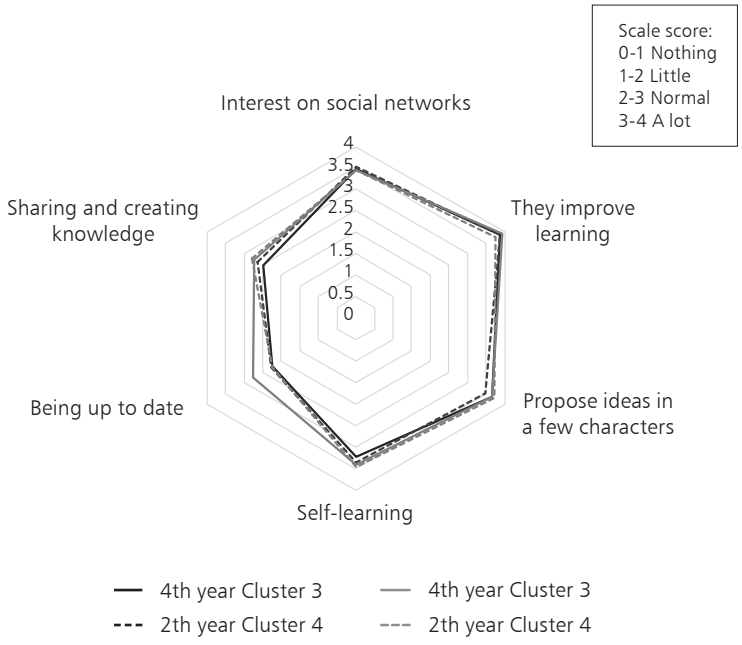
With regard to Early Childhood Education, there are major changes related to the usefulness of social networks and a greater relevance given to fostering self-learning. On the other hand, the changes decrease in "being up to date", "sharing and creating knowledge" and "proposing ideas in a few characters".

Figure 8a
Evolution in the degree of Primary Education



Source: own formulation

Figure 8b
Evolution in the degree of Primary Education



Source: own formulation

With regard to the students of Primary Education, their evolution shows that, according to them, social networks improve "being up to date" and "proposing ideas in a few characters". On the other hand, they do not evolve in "improving learning" and their own "interest on social networks".

The students of both degrees, Early Childhood Education and Primary Education show polarization and dispersion of their opinions about social networks, which may be related to a more critical attitude toward their advantages and disadvantages.

Conclusions

The use of technology is not a new phenomenon and many institutions of higher education employ management systems such as Blackboard and eLearn in their teaching-learning activities. However, these systems are under constant criticism, since they tend to foster an instructivist approach of teaching (Salavuo, 2008); thereby, social networks allow greater collaboration among students, according to the pedagogical paradigm of social constructivism (Huijser 2008). We agree with Orlando R. Kelm (2011) in that it is in fact this collaboration potential of the technologies of social networks what makes them more appealing for being integrated into the teaching-learning process.

In the present study, we accept the alternative hypothesis that "there are significant differences in the longitudinal analysis between the groups of the 2nd year of Early Childhood Education and Primary Education and those of the 4th year of Early Childhood Education and Primary Education for the relational, innovative and educational categories", as shown by the results.

The *relational* category corresponds to the factors related to the use of social networks. In both groups and at both time points, the social networks used most frequently are Facebook and Twitter. However, we

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must highlight the differences found for Twitter in the longitudinal analysis in the groups of Early Childhood Education at the initial time point, with 84% and 70%, compared to the results obtained at the final time point, with 24% and 25%, respectively. These results suggest that there was a decrease in the use of Twitter and an increase in the use of Facebook. With regard to the reasons for using them, "entertainment" was the most voted one at both time points, and "keeping in touch with friends and family" decreased in the group of Early Childhood Education.

The *innovative category*, related to the usefulness of social networks, is mostly positive in the two groups, both at the initial time point, with 88% and 94%, and at the final time point, with 82% and 94%, in Early Childhood Education and Primary Education, respectively. According to the participants, the most useful social networks are Facebook and Twitter for sharing documents and pictures, fostering communication between teachers and students, sharing knowledge among users and fostering communication in general. At the final time point, "Sharing documents and pictures" and "sharing knowledge" decreased in the groups of Early Childhood Education and increased in the groups of Primary Education. These data are consistent with the studies conducted by Edward J. Maloney (2007), Charlotte N. Gunawardena, Mary Beth Hermans, Damien Sánchez, Carol Richmond, Maribeth Bohley and Rebekah Tuttle (2009) and Jeff Hoyer, Gareth Thompson, Lisa LeBleu and Teresa Collard (2010).

The two social networks that are considered to be a potential complement to face-to-face teaching are Facebook and Twitter, although the students of Early Childhood Education preferred Facebook over Twitter at the beginning of the study, while at the end of it both groups chose Facebook.

In the *educational category*, there were differences between the students of Early Childhood Education and Primary Education for the item "teachers need training before using social networks in the classroom", in favour of those in Early Childhood Education. These students consider that teachers must receive training in order to be able to use social networks as didactic methods, and this evidence is constant through time, as shown by the data obtained in the longitudinal study.

In the *informative category*, no significant differences were found neither between the groups of Early Childhood Education and Primary Education nor between the two time points of the longitudinal study.

The cluster analysis allowed to analyse the homogenous groups that appeared according to degree and year of study (2nd and 4th), with the aim of determining the influence of the time period lapsed on the perception of the students on social networks as didactic methods. In this regard, the "utilitarian" group has a greater proportion of people between 26 and 33 years of age and a later initiation into social networks; however, the students of this group are the ones who show a more positive evolution in their interest on social networks, and they also consider them to be more relevant as a teaching complement. The "relational" group showed the sharpest decrease in the frequency of internet usage and the lowest interest on social networks; they also consider these to be less relevant as a teaching complement. The evolution of "believers" and "outsiders" from the second to the fourth year shows values of evolution and positive interest on social networks, with a preference toward the use of Twitter or LinkedIn over Facebook in the "believers", in contrast to the "outsiders".

With regard to the Degree in Early Childhood Education, there were major changes regarding the usefulness of social networks and a greater relevance given to "fostering self-learning". In contrast, the changes decreased for "being up to date", "sharing and creating knowledge" and "proposing ideas with a few characters". On the other hand, according to the participants of Primary Education, social networks are good for "being up to date" and "proposing ideas with a few characters". In contrast, there is no evolution for this group in "improving learning" and their own "interest on social networks".

The students of both degrees, Early Childhood Education and Primary Education show polarization and dispersion of their opinions about social networks, which may be related to a more critical attitude toward their advantages and disadvantages.

Although we understand that university students are much more predisposed to use technologies in studying and learning activities beyond what centres, teachers and educational processes can offer, we highlight self-learning, through the use of social networks, as a significant finding for all the participants, and especially for those in the Degree in Early Childhood Education.

With regard to advantages, the students of Early Childhood Education considered, at the beginning, the usefulness of social networks for "sharing documents and pictures", and the results show that, through time, the opinions were more varied, with the "capacity of social networks to motivate students" being the most voted one. In contrast, the students of Primary Education did not show changes through time; most of them highlighted the motivating and sharing capacity of social networks in education.

Regarding disadvantages, there was a large number of students of Early Childhood Education who considered the distracting nature and bad use of social networks.

And lastly, we observed a more critical attitude from all the students, which probably shows their increasing expectations on the use of social networks from the beginning of their degree to the end of it.

Limitations

One of the limitations of this study was the fact that the change in ICT is so quick that from one year to the other there may be a change in the attitudes and preferences of the students, and what they consider today to be a good didactic methodology to motivate their learning, they might see it as indifferent or barely useful after some time.

Further research lines

This study suggests new research lines, among which it is worth highlighting the following:

Comparative research with students from the next academic years, with respect to those of the present study, in order to determine the extent to which social networks are used as a didactic method and the new informatic tools that are used to that end.

Contrast research of the data obtained from the degrees of Early Childhood and Primary Education with qualitative data obtained through the use of more qualitative research instruments, such as interviews.

Cross-sectional research about the emotional and social aspects that influence the use of social networks as a didactic method. The new emotional and social categories of analysis could expand and complement the categories analysed in the research conducted.

Design of subject-specific didactic strategies, adapting the methodology to new channels, platforms and informatic applications, and qualitative research to determine whether the use of this didactic methodology increases the interest for the contents of the subjects that make up the academic curriculum of the degrees in Early Childhood and Primary Education.

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